

a light source emitting light beams, outgoing beam directions in which the light beams travel being arranged so as to cross each other at a point;

a deflection unit deflecting the light beams;

an optical unit causing the light beams from the deflection unit to form images on a scanned surface; and

an aperture situated close to said point and arranged to shape the light beams, wherein

said aperture is situated between said light source and said deflection unit to shape the light

beams before the light beams enter said optical unit that forms the images,

wherein said aperture shapes the light beams so as to have a given spot size, the

aperture being positioned close to a position at which the light beams cross each other, and

wherein the aperture is incorporated into deflection surfaces of the deflection unit, and

the given spot size of the light beam is larger than a size of each of the deflection surfaces.

REMARKS

Favorable reconsideration of this application, in view of the following comments and as presently amended, is respectfully requested.

Claims 1-31 are pending in this application. Claims 5-8 and 18-31 stand withdrawn from consideration. Claims 1, 4, 9-11, and 13 were rejected under 35 U.S.C. § 102(b) as clearly anticipated by U.S. patent 5,610,647 to Takada. Claims 1, 4, 9-11, and 13 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. patent 5,999,345 to Nakajima et al. (herein "Nakajima '345") in view of Takada. Claims 2 and 3 are allowed. Claims 12 and 14-17 were objected to as dependent upon a rejected base claim, but were noted as allowable if rewritten in independent form to include all of the limitations of their base claim and any intervening claims.

Initially, applicants gratefully acknowledge the early indication of the allowance of Claims 2 and 3 and the indication of allowable subject matter of Claims 12 and 14-17.

With respect to that indication of allowable subject matter, each of Claims 12, 14, and 15 is amended by the present response to be rewritten in independent form. Thus, each of Claims 12 and 14-17 is believed to be allowable, based on the indication of allowable subject matter in the outstanding Office Action.

Addressing now the rejection of Claims 1, 4, 9-11, and 13 under 35 U.S.C. § 102(b) as clearly anticipated by Takada, and under 35 U.S.C. § 103(a) as unpatentable over Nakajima '345 in view of Takada, those rejections are traversed by the present response.

It is initially noted that each of independent Claims 1 and 9 is amended by the present response to clarify a feature recited therein. Specifically, each of Claims 1 and 9 clarifies that the laser beams emitted by the laser diodes or light source are emitted "on slanting optical axes" so that those laser beams cross each other at a point. Claims 1 and 9 also recite that that point at which the light beams on the slanting optical axes cross each other is *close* to either a "light beam restricting unit" (Claim 1) or an "aperture" (Claim 9). Neither the applied art to Takada nor Nakajima teach or suggest the above-noted features.

Specifically, neither Takada nor Nakajima teach or suggest a structure in which light beams are emitted on "slanting optical axes to substantially cross each other at a point" *close* to a "light beam restricting unit" as recited in independent Claim 1; or similarly where light beams are output "on slanting optical axis arranged so as to cross each other at a point", and where the point is located *close* to an "aperture" as recited in independent Claim 9.

By utilizing such a structure in Claims 1 and 9, the light beams can be made to cross each other near a deflection point, thereby aligning a position of beam deflection. Such a structure achieves beam spots having a uniform size.

The applied art does not teach or suggest such a structure. Conventionally, and as in the applied art, as semiconductor lasers have a large divergent surface, a collimate lens may be positioned close to a light source to effectively collect light, with a focal distance being relatively short. According to the configuration such as taught by Takada, a beam-crossing position is situated right beside a collimate lens, which makes it difficult for beams to cross each other near a deflection point. Further, when a single collimate lens is used for a plurality of light sources, as in the case of a semiconductor laser array, a beam crossing point inevitably is right beside or close to the collimate lens.

Such teachings as in Takada differ from Claims 1 and 9 as noted above; in Claims 1 and 9 the beams do not cross each other near a collimate lens, but instead cross each other *close* to a deflection point or an aperture.

Further, in contrast to the claimed invention, Takada determines a beam-crossing position by selecting conditions of a collimate lens, i.e., a coupling lens.

In contrast to Takada, the claimed invention utilizes slanting optical axes to make the beams cross each other near a deflection point or aperture, or uses an optical system arrangement that achieves such a configuration.

Moreover, Nakajima '345 also does not teach or suggest a structure that makes beams cross each other *close* to a deflection point, and thus no combination of teachings in Nakajima '345 and Takada meets the claim limitations.

In such ways, the invention as recited in independent Claims 1 and 9, and the claims dependent therefrom, also patentably distinguishes over the applied art.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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Marked-Up Copy
Serial No: 09/552,657
Amendment Filed Herewith
12-11-02

IN THE CLAIMS

--1. (Twice Amended) A multibeam scan apparatus comprising:

a light source having semiconductor laser diodes and coupling lenses arranged in a main scan direction, the semiconductor laser diodes and coupling lenses being positioned so that light beams emitted by the semiconductor laser diodes as emitted on slanting optical axes to substantially cross each other at a point;

a light beam restricting unit shaping the light beams from the laser diodes through the coupling lenses so that the light beams have a given spot size, the light beam restricting unit being positioned close to the point;

a polygonal mirror; and

a scan lens causing the light beams reflected by the polygonal mirror to form images on a scanned surface, wherein said light beam restricting unit is situated between said light source and said polygonal mirror to shape the light beams before the light beams enter said scan lens that forms the images.

9. (Three Times Amended) A multibeam scan apparatus comprising:

a light source emitting light beams, outgoing beam directions in which the light beams travel being on slanting optical axes arranged so as to cross each other at a point;

a deflection unit deflecting the light beams;

an optical unit causing the light beams from the deflection unit to form images on a scanned surface; and

an aperture situated close to said point and arranged to shape the light beams, wherein said aperture is situated between said light source and said deflection unit to shape the light beams before the light beams enter said optical unit that forms the images.

12. (Amended) [The] A multibeam scan apparatus comprising: [as claimed in claim 11,]

a light source emitting light beams, outgoing beam directions in which the light beams travel being arranged so as to cross each other at a point;

a deflection unit deflecting the light beams;

an optical unit causing the light beams from the deflection unit to form images on a scanned surface; and

an aperture situated close to said point and arranged to shape the light beams, wherein said aperture is situated between said light source and said deflection unit to shape the light beams before the light beams enter said optical unit that forms the images,

wherein the light beams emitted by the light source cross each other at a position close to the deflection unit,

wherein said aperture shapes the light beams so as to have a given spot size, the aperture being positioned close to said position, and

wherein the light beams cross each other on a deflection surface of the deflection unit.

14. (Amended) [The] A multibeam scan apparatus comprising: [as claimed in claim 11,]

a light source emitting light beams, outgoing beam directions in which the light beams travel being arranged so as to cross each other at a point;

a deflection unit deflecting the light beams;

an optical unit causing the light beams from the deflection unit to form images on a scanned surface; and

an aperture situated close to said point and arranged to shape the light beams, wherein

said aperture is situated between said light source and said deflection unit to shape the light beams before the light beams enter said optical unit that forms the images,

wherein the light beams emitted by the light source cross each other at a position close to the deflection unit,

wherein said aperture shapes the light beams so as to have a given spot size, the aperture being positioned close to said position, and

wherein the aperture is incorporated into deflection surfaces of the deflection unit, and the given spot size of the light beams is larger than a size of each of the deflection surfaces.

15. (Amended) [The] A multibeam scan apparatus comprising: [as claimed in claim 13,]

a light source emitting light beams, outgoing beam directions in which the light beams travel being arranged so as to cross each other at a point;

a deflection unit deflecting the light beams;

an optical unit causing the light beams from the deflection unit to form images on a scanned surface; and

an aperture situated close to said point and arranged to shape the light beams, wherein

said aperture is situated between said light source and said deflection unit to shape the light beams before the light beams enter said optical unit that forms the images,

wherein said aperture shapes the light beams so as to have a given spot size, the aperture being positioned close to a position at which the light beams cross each other, and

[wherein the aperture is incorporated into deflection surfaces of the deflection unit, and the given spot size of the light beam is larger than a size of each of the deflection surfaces.--